SB761
V7N6
#74-12

INSECT DISEASE REPORT

USDA FOREST SERVICE/NORTHERN REGION

Report No. 74-12

5200
April 1974

A PINE BUTTERFLY IMPACT SURVEY ON THE BITTERROOT NATIONAL FOREST AND STATE OF MONTANA LANDS - 1973

by

Jerald E. Dewey[1/], Hubert E. Meyer[2/]
Rudolph C. Lood[2/], and Steve Kohler[3/]

LIBRARY
APR 18 1974
ROCKY MOUNTAIN STATION

INTRODUCTION

Pine butterfly, *Neophasia menapia* (F. & F.), reached epidemic levels on portions of the Bitterroot National Forest, Montana, and adjacent State and private lands from 1970 through 1973. Defoliation to ponderosa pine in infested areas ranged from just detectable to almost complete stripping.

Because extensive mortality to ponderosa pine has been attributed to past pine butterfly epidemics (Hopkins 1907; Evenden 1940), a damage survey was initiated in the fall of 1972. The objective of the survey was to document impact of this outbreak on timber resources by measuring condition of selected trees throughout the duration of the outbreak and for at least 5 years following the outbreak. Permanent plots were established in eight of the most severely defoliated areas and five moderately damaged areas. Plot locations are identified and survey techniques explained by Dewey et al. (1973).

The plots were resurveyed in December 1973 and tree condition compared to that of one year ago. This is a report of the 1973 survey.

1/ Entomologist, USDA Forest Service, Region 1, Division of State and Private Forestry, Missoula, Montana.

2/ Biological Technician, USDA Forest Service, Region 1, Division of State and Private Forestry, Missoula, Montana.

3/ Entomologist, Department of Natural Resources and Conservation, Division of Forestry, State of Montana, Missoula, Montana.

LIBRARY
5 1974
ROCKY MOUNTAIN STATION

RESULTS AND DISCUSSION

Twelve of the 13 study areas were resurveyed. One moderately defoliated area (Sleeping Child Creek) was omitted due to access difficulties. All but a very few of the 1,053 sample trees were relocated.

Summaries of current stand conditions are shown in tables 1 and 2. "Heavily defoliated" and "moderately defoliated" classifications are based on stand condition in 1972 since only light defoliation occurred in 1973.

Table 1.--Summary of condition of stands heavily defoliated by pine butterfly, Bitterroot National Forest and adjoining State and private lands, December 1973

Tree condition class	Average d.b.h. (inches)	Trees/acre (5+ inches d.b.h.)	Volume/acre (bd. ft.)	Percent of stand	Percent of volume
Negligible defoliation (0)	11	7.3	556	10.2	10.1
Light defoliation (1)	10	5.5	462	7.7	8.4
Moderate defoliation (2)	11	50.6	3,797	70.7	68.7
Heavy defoliation (3)	14	5.6	601	7.8	10.9
Severe defoliation (4)	17	.5	75	.7	1.4
Killed by bark beetles (5)	26	Less than 1	25	Less than 1	.5
Killed, miscellaneous (6)	9	2.1	11	2.9	.2
TOTAL		71.6	5,527		

Table 2.--Summary of condition of stands moderately defoliated by pine butterfly, Bitterroot National Forest and adjoining State and private lands, December 1973

Tree condition class	Average d.b.h. (inches)	Trees/acre (5+ inches d.b.h.)	Volume/acre (bd. ft.)	Percent of stand	Percent of volume
Negligible defoliation (0)	10	27.5	1,110	34.5	24.7
Light defoliation (1)	10	35.5	2,090	44.6	46.5
Moderate defoliation (2)	11	15.4	1,173	19.3	26.1
Heavy defoliation (3)	10	1.2	119	1.5	2.6
Severe defoliation (4)	--	--	--	--	--
Killed by bark beetles (5)	--	--	--	--	--
Killed, miscellaneous (6)	--	--	--	--	--
TOTAL		79.6	4,492		

Although the fall 1972 overwintering pine butterfly egg population was quite high, the subsequent 1973 spring larval population was quite low. Some of the reasons for this include: egg predation; nonviable eggs; larval predation; parasitism; and larval mortality. Part of this natural morality probably resulted from what Cole (1956) refers to as being unable to survive the resin flow of injured needles. It appears that early instar pine butterfly larvae need to feed gregariously to overcome normal resin flow. Many of the eggs deposited in 1972 were laid singly or in clusters of two or three. These contributed to the egg counts but likely did not survive long as larvae. As a result additional defoliation in 1973 was light in most areas.

Very little tree mortality (2.9 percent of the heavily defoliated stands) has occurred to date. This is quite surprising considering that 30 percent of the stand in the heavily defoliated areas was almost completely defoliated by the fall of 1972. Trees recovered dramatically in 1973 and now most trees have at least 1 year's complement of needles. In 1972, 67 percent of the trees in the heavily defoliated areas and 16 percent in the moderately defoliated areas were rated as heavily and severely defoliated (Classes 3 and 4). In 1973 only 8.5 percent of the trees in the heavily defoliated areas and 1.5 percent in the moderately defoliated areas were rated Classes 3 and 4. From this, it appears that tree recovery will be almost complete.

Localized areas have suffered significant bark beetle mortality, but in general beetles seem to be endemic. Still, the potential exists for a bark beetle buildup in the next few years. Though most trees appear to be recovering, they will probably be in a somewhat weakened condition for a few more years and, as such, could be susceptible to bark beetle attack. The drought in 1973 could be a contributing factor. Some activity of mountain pine beetle, *Dendroctonus ponderosae* Hopk.; pine engraver, *Ips pini* (Say); red turpentine beetle, *D. valens* Lec.; and western pine beetle, *D. brevicomis* Lec., has been noted in the area of pine butterfly defoliation. These insects are also active in areas which were not defoliated by pine butterfly.

Because all effects of pine butterfly defoliation (reduced increment growth and mortality of weakened trees by bark beetles) may not become manifest within 1 or 2 years after defoliation (Evenden 1940), the plots will be resurveyed in the fall of 1977. Increment cores will be taken at that time to evaluate the effect of defoliation on radial growth.

The effect of this pine butterfly outbreak on regeneration was measured by tagging 30 trees of less than 5 inches d.b.h. (ten 1- to 5-foot trees; ten 5- to 10-foot trees; and ten 10- to 20-foot trees) at each of the five locations, and following their condition throughout the outbreak. Because of snow conditions only two plots were remeasured. Each tree was rated 0 to 4 in terms of intensity of defoliation. Zero equalled no visible defoliation and 4 equalled almost complete defoliation. The two plots measured in 1972 and 1973 had the following average defoliation ratings:

Plot	1972 rating	1973 rating	Difference
Sweeney Creek	1.67	1.00	0.67
Larry Creek	2.77	1.17	1.60

All trees either improved in condition or stayed the same in 1973. In 1972, nine of the 30 trees and 17 of the 30 trees in Sweeney Creek and Larry Creek, respectively, were rated in defoliation classes 3 and 4. No trees at either plot were rated 3 or 4 in 1973. Recovery was noted in all height classes.

LITERATURE CITED

Cole, Walter E., 1956. Surveys and control methods of the pine butterfly during an outbreak in southern Idaho, 1953-1954. USDA Forest Serv., Intermountain Forest and Range Expt. Sta., Ogden, UT 84401, Research Note 30.

Dewey, Jerald E., Hubert E. Meyer, Rudolph C. Lood, and Steve Kohler, 1973. A pine butterfly impact survey on the Bitterroot National Forest and State of Montana lands - 1972. USDA Forest Serv., Northern Reg., Div. State and Priv. Forestry, Missoula, MT 59801, report 73-12.

Evenden, J. C., 1940. Effects of defoliation by the pine butterfly upon ponderosa pine. J. Forestry 38: 949-55.

Hopkins, A. D., 1907. Notable depredations by forest insects. USDA Yearbook, pp. 149-164.